BaseCam 1.0 board Manual

Introduction

The BaseCam system is a simple way to create a powerful stabilization for small and medium cameras used on small remote controlled aircraft or in other applications where a fast acting stabilization is needed. Instead of using servos, it uses special wound brushless motors to overcome camera inertia. An Inertial Measurement Unit (IMU) is mounted to the camera, and gives position feedback to the controller.

BaseCam can be used standalone or in conjunction with flight controller camera stabilisation and control.

Software and hardware designed by Alex Moskalenko. Board layout/design by Felix Niessen. Produced by Viacopter, Flyduino and E-copter.

This manual only concerns hardware. The software manual can be found at:

http://www.simplebgc.com/eng/downloads/

Specifications

50*50 mm board with 45*45 mm M3 mounting pattern
Atmega 328P
Onboard USB
Serial headers for wireless connection
ST L6234 motor drivers
MPU 6050 Inertial Measurement Unit

Absolute ratings

Input voltage (Recommended/Maximum) : 7,4 - 16.4V / 20V
Max motor current without cooling: 1.5A per motor
Max USB Power: 500 mA (fuse protected)
Board operating temp: -20C to +80C
Motor driver temperature shutdown at +165 C

Camera balancing

To work properly, the camera has to be balanced on all 3 axises so that its suspended on its exact center of gravity and can move freely in any direction without falling back to a certain position.

If the camera is balanced correctly, the motors will only have to overcome the inertia of the camera to work against outside disturbances. Coupled with the right motor and settings, camera loads up to 1500 grams have been shown to work.

But if the camera is not balanced properly, or the wrong motors and settings are used, it will overload the motors and drivers, degrade performance and possibly also burn motors.

If the motor drivers are overloaded, they will heat up and eventually shut down. If you can´t hold your finger on the motor drivers while the motors are running, you are drawing too much power.

USB Connection

The Basecam 1.0 board has an onboard CP2102 USB to Serial converter for convenient and easy connection to a computer for configuration.

You may need to install Virtual COM Port(VCP) drivers for the CP2102 converter to connect to your computer for the first time. They can be found at Silicon Labs support pages:

http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx

Warning: Always disconnect the motors or keep the board powered from main power when you connect the USB cable. USB port can only deliver 500mA at 5 volts, and will not be able to deliver enough power for the motors to run. The USB power is protected by a 500 mA fuse, so if you draw more than that, the fuse will trigger. If the fuse is triggered, it will need to cool down and then the board will work again.

Serial connection

If you wish to be able to tune wirelessly or need telemetry from the gimbal in flight, any RS232 serial transceiver at 115200 baud can be hooked to the serial connector headers.

PWM connections

There is 4 PWM connectors available that allows to connect R/C channels to the board to control camera Tilt and Pan.

The output from your flight controller gimbal control can also be connected to the Basecam controller. This is used to know the attitude of the airframe and further refine stabilisation. Refer to the Basecam software manual for further details on setup of R/C control.

I2C connection

The I2C port is used to connect the Inertial Measurement Unit (IMU) that is fixed to the camera. Use the supplied JST-SH wire.

Black: GND, Red: VCC, Green: SCL, Yellow: SDA

Inertial Measurement Unit

The supplied Inertial Measurement Unit (IMU) needs to be fixed to the camera so it follows the camera. Y axis is forward. (IMU orientation can be changed in upcoming software release)

Board assembly

The controller is supplied as a SMT-preassembled kit, and you need to solder the headers on yourself, and solder the open end of the JST-SH wire to the IMU.

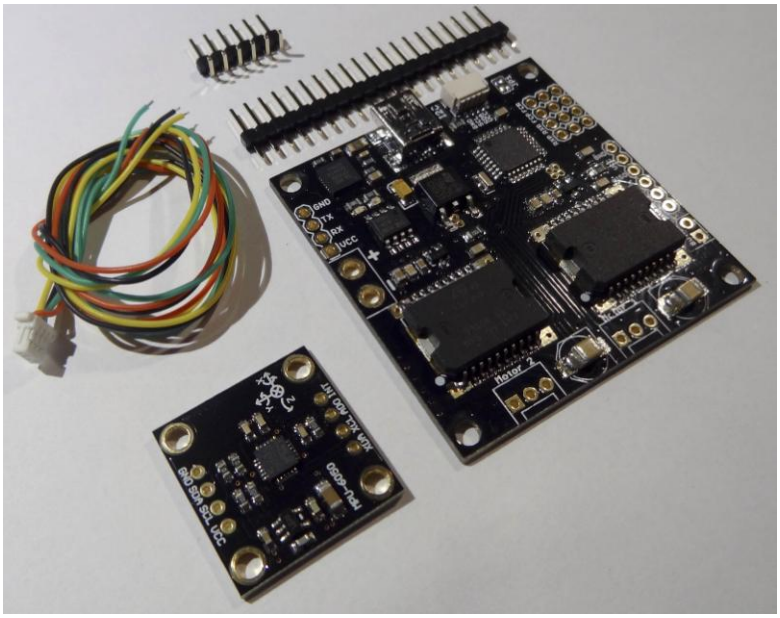
Input power wire needs to be 22AWG or thicker.

Soft and Flexible silicone wires should be chosen for motor connections.

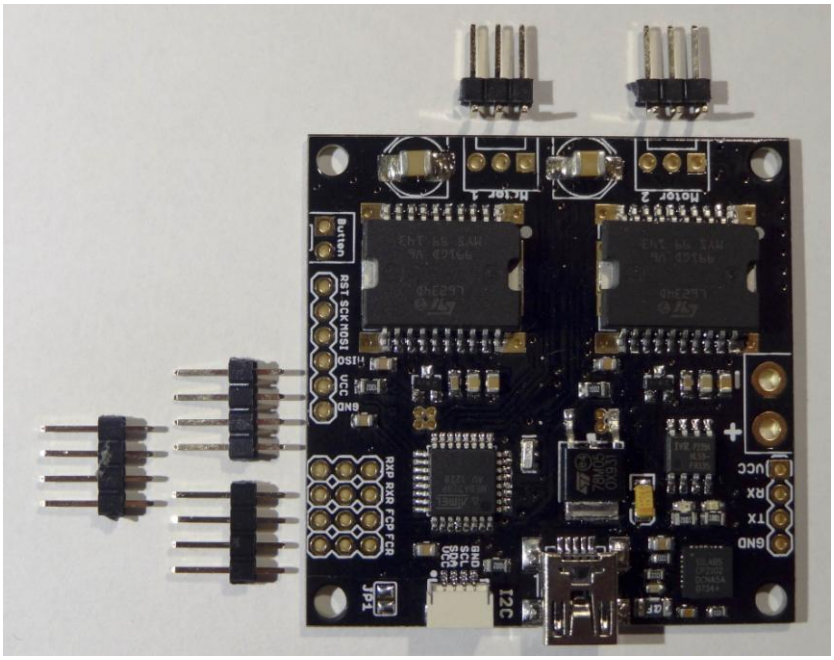
Assembly guide

Kit contents:

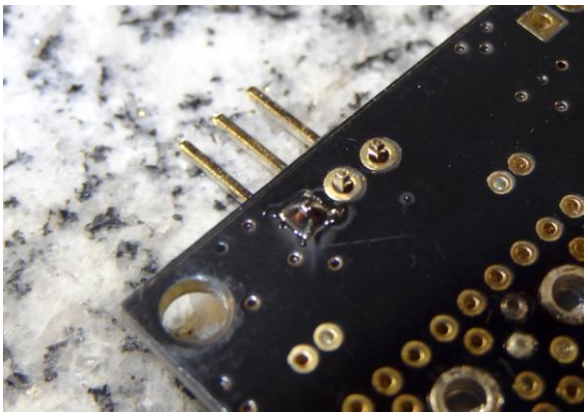
- Basecam board
- IMU Board
- JST-SH IMU connection cable
- 1*20 male straight breakoff header
- 1*6 angled male breakoff header

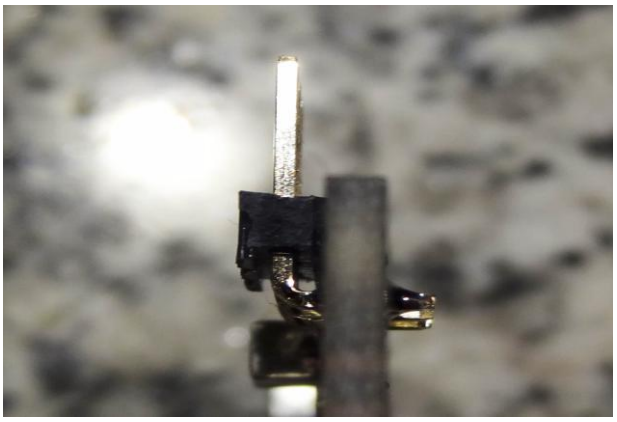


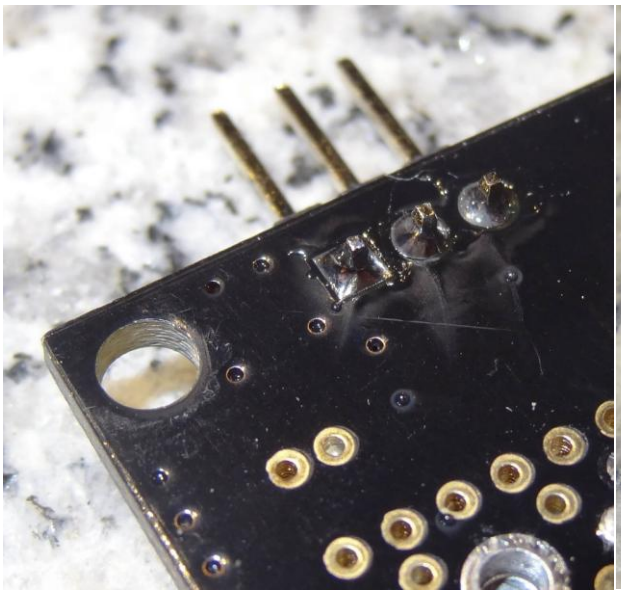
Break off the headers like shown:

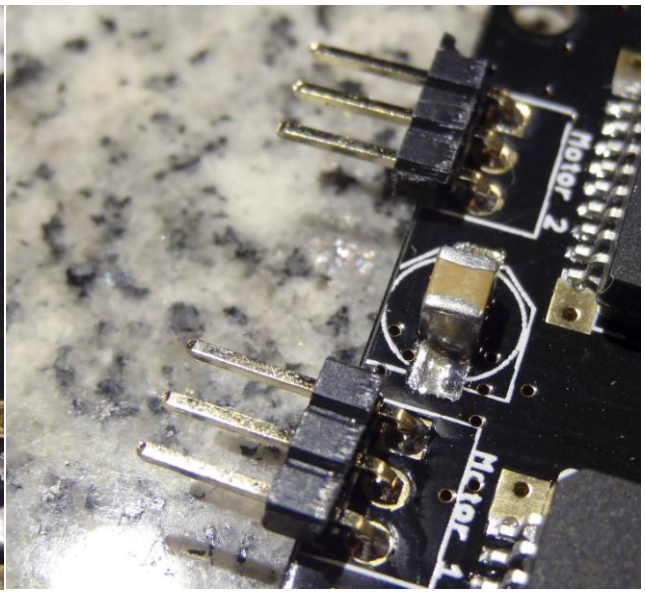


Start with the motor headers. Solder one pin, and check alignment before soldering the remaining pins:



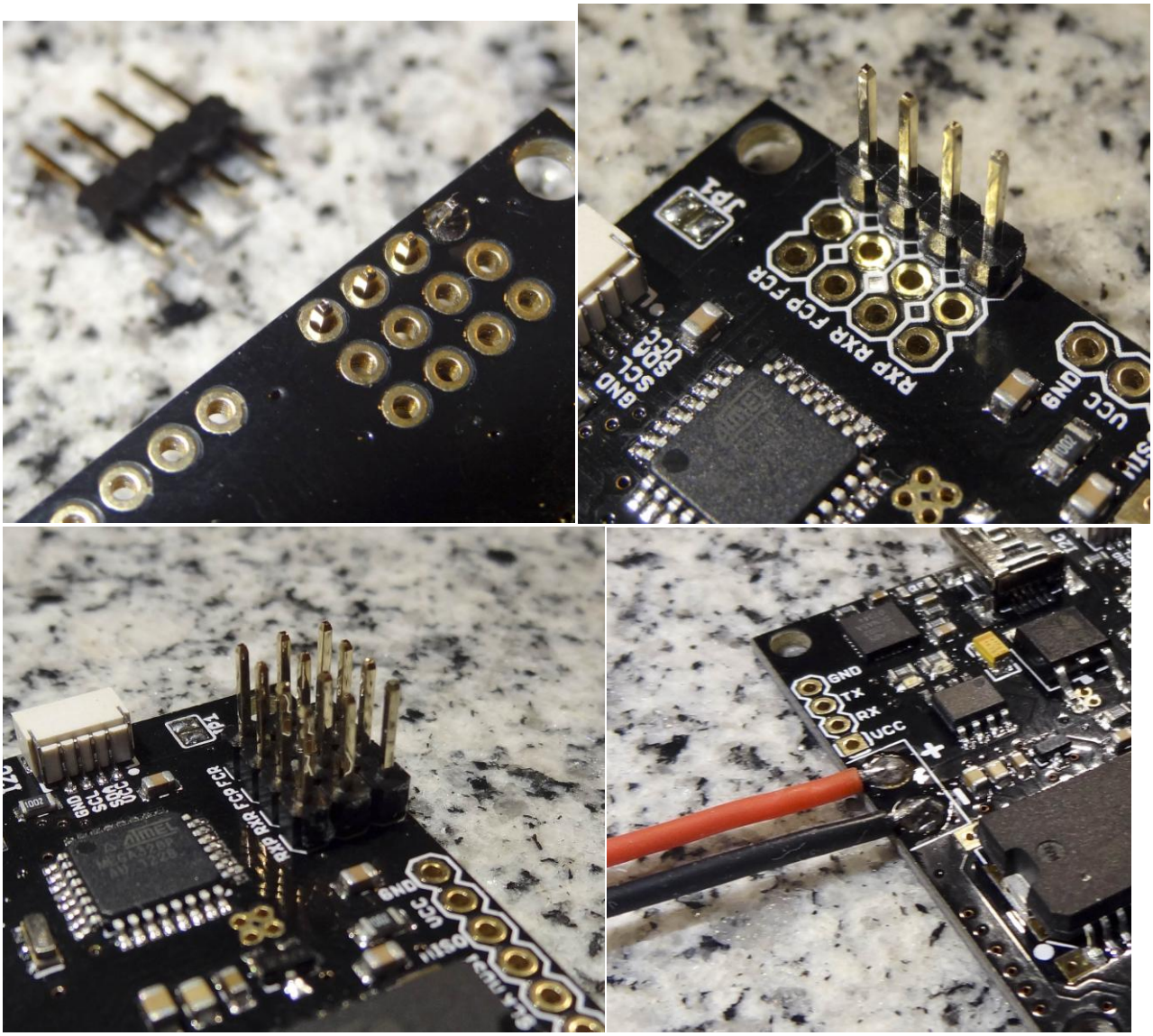




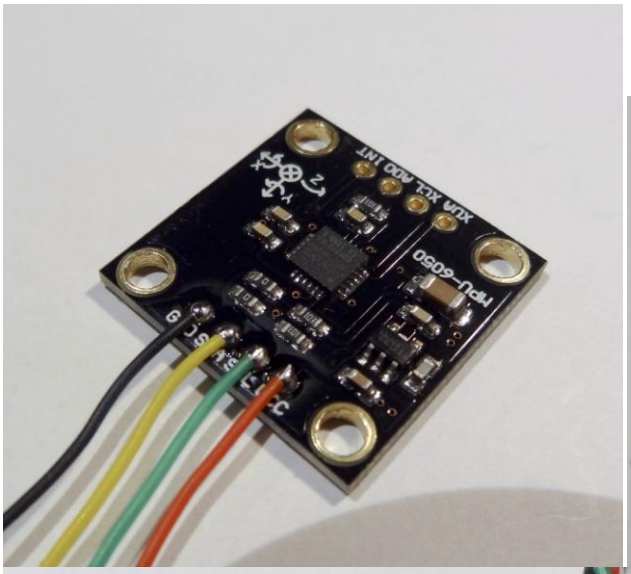


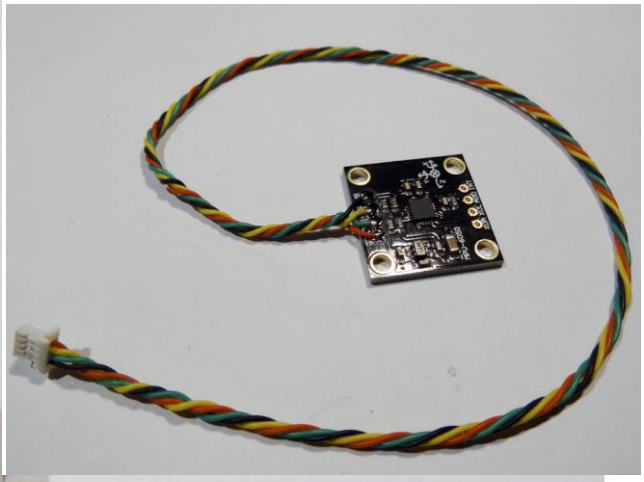
Then proceed with the RX headers:

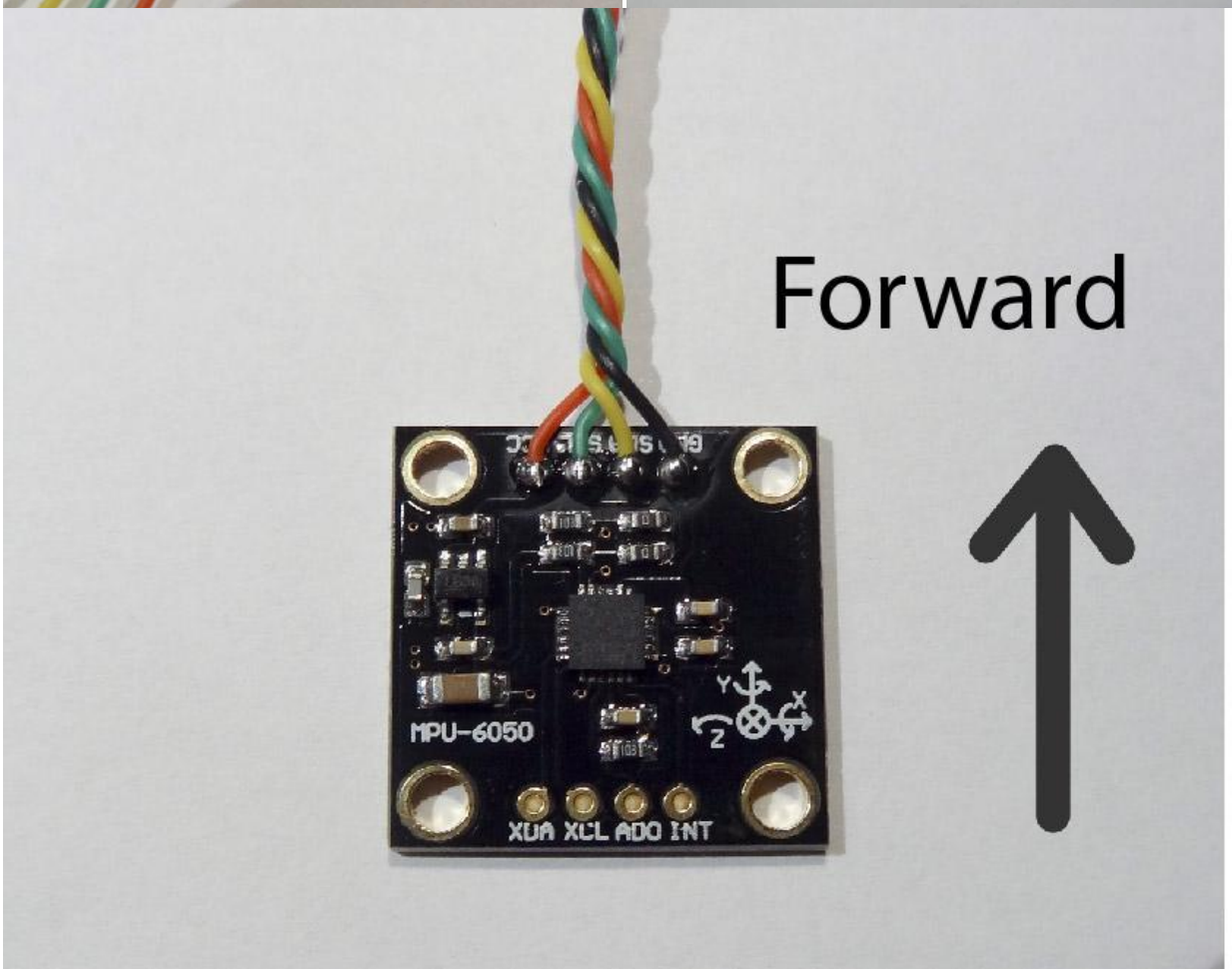
Same procedure: Solder one pin, check alignment, solder remaining pins. Then solder on main power wire:



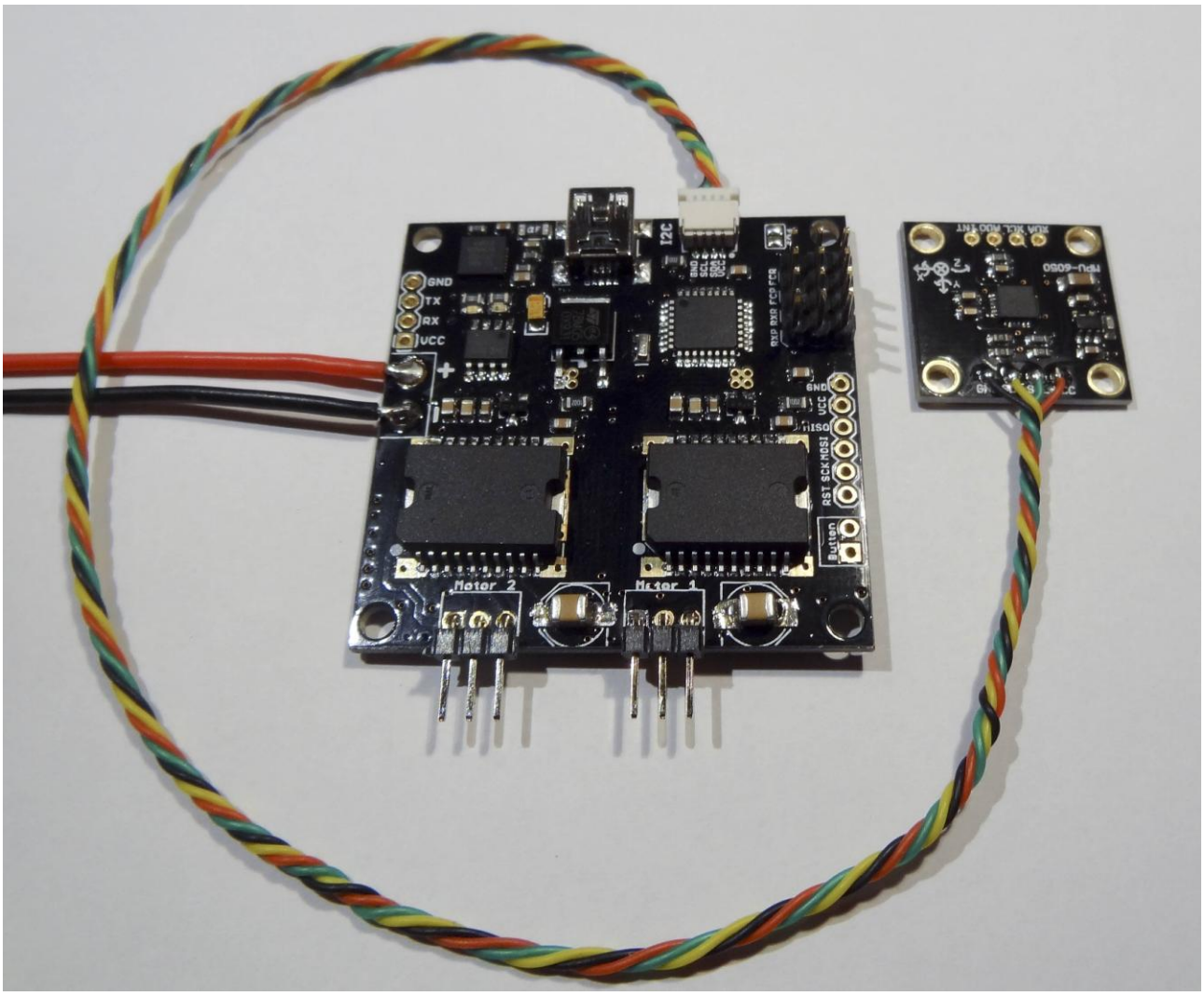
Solder the JST-SH wire to the IMU and twist the wire:







Completed Basecam board:



Enjoy!